Formula Sheet for the Class I-SP & A-SO Exams

Revised 05/00

F001

Surface area of a pond, acres =

$$\frac{\text{Length, ft x width, ft}}{43560}$$

F002

Volume of a pond, MG =

$$\frac{\text{(Surface area, sf + bottom area, sf)}}{2} \times \text{Depth, ft} \times 7.48 / 10^6$$

F003

BOD loading = Flow, mgd x BOD conc, mg/l x 8.34

F004

BOD removal efficiency, % =

$$\frac{\text{(Influent BOD, mg/l - effluent BOD, mg/l)}}{\text{Influent BOD, mg/l}} \times 100$$

F005

Organic loading, lbs BOD/day/acre =

$$\frac{\text{(Flow, mgd) x (Influent BOD, mg/l) x 8.34}}{\text{Pond surface area, acre}}$$

F006

Population loading, person/acre =

$$\frac{\text{Population served}}{\text{Pond surface area, acre}}$$

F007

Population equivalent, persons/day =

$$\frac{\text{BOD load, lbs/day}}{0.17}$$

F008

Theoretical detention time of a pond, days =

$$\frac{\text{Volume of the pond, MG}}{\text{Flow rate, MGD}}$$

F009

Detention time, hrs =

$$\frac{\text{Volume, MG}}{\text{Flow rate, MGD}} \times 24 \text{ hrs/day}$$

F010

Flow rate, MGD =

$$\frac{1440}{1{,}000{,}000} \times \text{Flow rate, gpm}$$

F011

Removal efficiency, % =

$$\frac{\text{(Influent conc - effluent conc)}}{\text{Influent conc}} \times 100\%$$

F012
Solids loading, lbs/day = (Flow, MGD) x (influent TSS, mg/l) x 8.34

F013
Required effluent BOD conc, mg/l =
(Influent BOD, mg/l) x [(100 - required removal, %) / 100]

F014
Volume of a circular tank, cf =
0.785 x (diameter, ft)^2 x (depth, ft)

F015
Sludge volume index, ml/g =

$$\frac{\text{(Settleable solids, \%)} \times 10{,}000}{\text{MLSS mg/L}}$$

F016
Average flow rate, MGD =

$$\frac{\text{(Final flow, MG) - (initial flow, MG)}}{\text{Time elapsed, days}}$$

F017
BOD loading, lbs/day =
(Flow rate, mgd) x (BOD, mg/l) x 8.34

F018
TSS removal efficiency, % =

$$\frac{\text{(Influent TSS - effluent TSS)} \times 100\%}{\text{Influent TSS}}$$

F019
Sludge age, days =

$$\frac{\text{MLSS in aeration tank, lbs}}{\text{Primary effluent SS, lbs/day}}$$

F020
Volume of sample needed for a BOD test bottle, ml =

$$\frac{1200}{\text{Estimated BOD of the sample, mg/l}}$$

F021
BOD, mg/l =

$$\frac{\text{(Initial D.O., mg/l - final D.O., mg/l)} \times 300 \text{ ml}}{\text{Sample volume, ml}}$$

F022
Chlorine feed rate, lbs/day =
(Flow, mgd) x (dosage, mg/l) x 8.34

F023
TSS test results, mg/l =

$$\frac{\text{Net dry weight, mg} \times 1000}{\text{Sample volume, ml}}$$

F024

$$\text{HTH feed rate, lbs/day} = \frac{\text{Chlorine required, lbs/day}}{\text{Lbs of chlorine in 1 lb of HTH}}$$

(HTH = High Test Hypochlorite)